

IN THE DRAWING:

If the Examiner does not object, please replace Figures 1 and 2 of the Drawing with the new formal versions of Figures 1 and 2 attached herewith, each marked "Replacement Sheet". No new matter has been entered, and the drawings are believed to be in allowable condition.

REMARKS

This Amendment is filed in response to the Office Action dated May 1, 2007. All objections and rejections are respectfully traversed.

Claims 1, 3-9, 12-14, and 16-20 are in the case.

Claims 1, 3, 6-9, 12-13, and 16-19 have been amended to better claim the invention.

Claims 2, 10-11, and 15 have been cancelled without prejudice.

Request for Examiner Interview

The Applicant respectfully requests a telephonic interview with the Examiner after the Examiner has had an opportunity to consider this Amendment, but before the issuance of the next Office Action. The Applicant's undersigned attorney may be reached at 617-951-2500.

Specification

The Specification has been amended to correct a typing error and to insert proper reference numbers as illustrated in the originally filed Drawings. No new matter has been entered, and the Specification is believed to be in allowable condition.

Objections to Drawings

On page 2 of the Office Action, the Examiner objected to the Drawings. The Drawings have been amended with care to ensure that no new matter has been entered, and the Drawings are believed to be in allowable condition.

Provisional Double Patenting Rejection

On page 4 of the Office Action, the Examiner provisionally rejected claims 1-20 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-20 of copending U.S. Application Serial No. 10/799,232, filed on even date as the present application. Applicant will consider filing a timely filed terminal disclaimer in compliance with 37 C.F.R. 1.321(c) or 1.321(d) to overcome an actual double patenting rejection should the Examiner reinstate the rejection after review of the present Amendments/Response, and/or after the conflicting claims have been patented.

Claim Rejections - 35 U.S.C. §112

On page 5 of the Office Action, the Examiner rejected claims 10 and 12 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to point out and distinctly claim the subject matter which applicant regards as the invention. Claim 10 has been cancelled without prejudice, and claim 12 has been amended, and is believed to be in condition for allowance.

Claim Rejections - 35 U.S.C. §102

On page 6 of the Office Action, the Examiner rejected claims 1-5, 12-15, and 19-20 under 35 U.S.C. §102(e) as being anticipated by Lavi et al., U.S. Patent No. 6,950,977, issued on September 27, 2005, hereinafter “Lavi”.

Applicant’s novel invention, as set forth in representative claim 1, comprises in part:

1. A method comprising:

performing a cyclic redundancy check (CRC) on each of a plurality of code blocks of a turbo product code (TPC) code word;

assigning an artificially high probability confidence measure to bits of any of the plurality of code blocks which pass the CRC; and

iteratively decoding the TPC code word between a soft decision algorithm of a sequence detector and a TPC decoder using the artificially high probability confidence measure assigned to bits of code blocks which pass the CRC.

Lavi discloses a mechanism for turbo-decoding when a cyclic redundancy check (CRC) for partial blocks is provided. In particular, Lavi describes a turbo-decoder and process that performs multiple turbo-decoding iterations based on reliability information (extrinsic data) to determine whether a turbo code block has been decoded properly. For instance, Lavi specifically teaches a technique that may be applied if a single turbo code block is divided into a plurality of code words, each code word having its own CRC check. This specific technique, performed within Lavi's turbo-decoder, provides for a CRC check of each individual code word, such that in the event a code word passes the CRC check, subsequent turbo-decoder iterations may presume that the data within the passed code word is substantially correct (i.e., have high reliability or "saturated extrinsic data"). In other words, Lavi's turbo-decoder receives turbo code blocks (data), decodes the data, applies reliability information to the data, determines whether the decoded data passes a CRC check, and feeds the results of the CRC check back to the iterative turbo-decoding process for use in decoding the data in further iterations (See Lavi, Col. 3, lines 51-65, and Col. 7, lines 26-30 and 38-44).

Applicant respectfully urges that Lavi does not show Applicant's claimed novel *iteratively decoding the TPC code word between a soft decision algorithm of a sequence detector and a TPC decoder using the artificially high probability confidence measure assigned to bits of code blocks which pass the CRC.*

Applicant also claims a technique for iteratively decoding a turbo product code (TPC), a type of turbo code. Applicant's claimed novel invention, however, goes beyond the iterative decoding within the turbo-decoder of Lavi (e.g., within Applicant's TPC decoder), and includes an iterative decoding process between a soft decision algorithm of

a sequence detector (e.g., implementing a soft output viterbi algorithm (SOVA) or Bahl, Cocke, Jelinek, and Raviv (BCJR) algorithm) and a TPC decoder. As is well known in the art, *sequence detectors* are used to output a maximum likelihood sequence corresponding to a particular encoded bit stream (e.g., interleaved data), and to include with each possible sequence a probability of that sequence being correct. *Decoders*, such as *turbo decoders or TPC decoders*, on the other hand, are used to decode data (e.g., de-interleaved data) into code blocks of a code word (or sub-blocks of a larger code block), based on the probabilities received from the detectors. The *decoders* may redefine probabilities based on parity checks, and may pass these new probabilities to the *detectors* (through an interleaver) to re-process the data (See Applicant's Specification, page 9, lines 3-21).

In particular, according to Applicant's claimed novel invention, a CRC may be performed on each of a plurality of code blocks of a TPC code word, and an artificially high probability confidence measure (reliability information) may be assigned to bits of any of the plurality of code blocks which pass the CRC. In addition, these artificially high probability confidence measures of bits of code blocks which pass the CRC may be iteratively used by both the TPC decoder *and the soft decision algorithm of a sequence detector* to attempt to properly decode the data. Applicant respectfully directs the Examiner to Applicant's Fig. 9 and the related discussion in Applicant's Specification at page 14, lines 18-24, which, to one skilled in the art, demonstrates the value of informing the *sequence detector* of the CRC-assigned artificially high reliability information of certain code blocks (sub-blocks). Namely, by informing the *sequence detector* of the reliability information generated by the TPC (turbo) *decoder* and CRC, the iterative process between the detector and decoder may become more efficient by reducing the number of paths/computations necessary by the sequence detector, since the detector can safely assume that the CRC-passed blocks (with high reliability information) are correctly decoded (See Applicant's Specification, page 10, lines 17 through page 11, line 5).

Lavi does not teach or show an iterative decoding process between a TPC decoder and a soft decision algorithm of a sequence detector. Lavi merely discloses feedback of CRC information for code blocks (sub-blocks) within the decoding process of the *decoder*. In fact, the only inferred mention of a detector in Lavi comes from Lavi's Background (Col. 3, lines 7-10), which states "If the CRC test fails [after turbo decoding], nothing can be done, except at the system level where it may be possible to request a complete retransmission of the data." Applicant respectfully urges that this clearly points out that Lavi does not teach or disclose an iterative decoding process between the turbo-decoder and a detector, as in Applicant's claimed invention. (Applicant also respectfully points out that the interleaving and de-interleaving within Lavi's turbo-decoder is a function of the manner in which the parity information is generated for the turbo code, and not for the storage/transmission of data as received by a detector. As such, decoders 1 and 2 (30 and 33 of Fig. 4) are both turbo-decoders as portions of a two-step turbo-decoding process)

Applicant respectfully urges that the Lavi patent is legally precluded from anticipating the claimed invention under 35 U.S.C. §102 because of the absence from the Lavi patent of Applicant's claimed novel *iteratively decoding the TPC code word between a soft decision algorithm of a sequence detector and a TPC decoder using the artificially high probability confidence measure assigned to bits of code blocks which pass the CRC.*

Claim Rejections - 35 U.S.C. §103

On page 9 of the Office Action, the Examiner rejected claims 6-11 and 16-18 under 35 U.S.C. §103(a) as being unpatentable over Lavi in further view of Applicant's Admitted Prior Art, hereinafter "AAPA". Claims 6-9, and 16-18 are dependent claims which are believed to be dependent from allowable independent claims for the reasons described above, and therefore in condition for allowance. Claims 10 and 11 have been cancelled without prejudice.

Conclusion

All independent claims are believed to be in condition for allowance.

All dependent claims are believed to be dependent from allowable independent claims, and therefore in condition for allowance.

Favorable action is respectfully solicited.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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